PUB/DAYMARK - 16 Reference: Daymark Load Forecast Report Pages 17 to 19, 54, 55, and 61; PUB MFR 97; Coalition/MH I-25

a) Please confirm whether Daymark assessed the information provided by the customers in the Top Consumers sector to Manitoba Hydro (summarized in PUB MFR 97) and whether Daymark formed its own conclusions about the reasonableness of the short term Top Consumers load forecast. If confirmed, please provide those conclusions.

b) Considering the short term plans communicated to Manitoba Hydro by the Top Consumers reflect the previously proposed 3.95% rate increases as explained in Coalition/MH I-25, please indicate whether and by how much the Top Consumers load forecast may change based on the proposed 7.9% rate increases.

Response:

a) Daymark assessed information provided in PUB MFR 97 along with the discussion with MH to evaluate the reasonableness of the short-term Top Consumers load forecast. The short-term forecasts were created for each individual customer using information about the individual companies' operating plans, short-term expansion or contraction plans as shared in the news and in publications, company prospectuses, and through information gathered by MH's key account representatives. Given the nature of these large customers, Daymark believes that the use of specific business plans as relied on in this methodology and as used by MH is reasonable to forecast Top Consumer's short-term load. These consumers will be impacted by the price increases, but the short-term forecast is conservative, and the response is likely to require more time to implement (such as moving operations to another facility).

b) The proposed 7.9% price increase may decrease the short-term load of Top

Consumer category. Daymark estimated the potential reduction of 185 GWh in the short-term by using the price elasticity estimated by MH from PLIL methodology, difference in recently proposed real electricity price change and previously proposed 3.95% rate increase, and annual short-term Top Consumer load. The table below contains a detailed annual calculation of short-term load decrease in both proposed rate increase scenarios. The final column shows the net impact on short-term load of Top Consumers due to the incremental increase in rate in two different proposals. Please note that this load reduction may be in the upper range of short-term load reduction considering that the calculation uses long-term price elasticity estimated via PLIL methodology. The price responsiveness of the Top Consumer category in the short-term may be lower than in the longer term.

Year	*Short-term load of Top Consumers (GWh)*	*Decrease in load with 7.9% proposed rate increase (GWh)*	*Decrease in load due to 3.95% proposed rate increase (GWh)*	*Net impact on load with proposed rate increase (GWh)*
2017/18	5,615	-70.0	-82.9	12.9
2018/19	5,440	-165.8	-80.3	-85.5
2019/20	5,475	-116.8	-80.8	-36.0
2020/21	5,502	-117.8	-81.2	-36.6
2021/22	5,943	-127.4	-87.7	-39.7
Total Short-term Load Impact (GWh)		**-597.7**	**-412.9**	**-184.9**

PUB/DAYMARK - 17 Reference: Daymark Load Forecast Report Page 50

Please explain whether the 2017 load forecast is lower than the 2014 load forecast primarily due to methodology changes or to changes in the inputs (population, GDP, income, etc.).

Response:

The decrease in 2017 load forecast as compared to 2014 load forecast is due to several factors. For example, in top consumer category, MH has revised downward the load of companies included for the short-term forecast. Similarly, in the long-term, MH has used a conservative PLIL methodology in 2017 that is forecasting lower long-term load than the methodology used in 2014. The PLIL methodology uses electricity price and blended GDP as input variables for Top Consumer's long-term load forecast. And these variables have also been updated in 2017 PLIL methodology as compared to 2014 methodology. Daymark would need to further investigate the detailed 2014 data in order to quantify each factor's impact on the difference in load observed between 2014 and 2017 analysis.

PUB/DAYMARK - 18 Reference: Daymark Load Forecast Report Page 14; PUB/MH I-53c

Please explain whether it is problematic to use data sets over different periods for the inputs to the different sector forecasts, as shown in PUB/MH I-53c.

Response:

In response to PUB/MH I-53c., Manitoba Hydro mentioned that they utilize different historical forecast periods in the different load-forecasting models in order to eliminate outliers in the regression analysis tied to earlier years that featured rate definitions and customer classifications that differed from the current rate definitions. Furthermore, the company mentioned that they do not have sufficient data from earlier years to credibly fit the regression model in earlier years.

Daymark believes that using different historical periods for different sectors are acceptable based on the data availability issue or based on the economic reasoning. However, use of different periods are just based on eliminating outliers, there needs to be further research on the underlying reasons for outlies to have occurred in the analysis period and document the method in the load forecast reports.

PUB/DAYMARK - 19 Reference: Daymark Load Forecast Report Page 15

Please explain whether it is problematic to use a lagged electricity price for General Service Large and a non-lagged electricity price for General Service Small and Medium when determining price elasticity.

Response:

It is not problematic to use a lagged electricity price for General Service Large and a non-lagged electricity price for General Service Small and Medium when estimating price elasticity. The price elasticity estimated using the regression analysis is the average price responsiveness to electricity demand during the analysis period. A model with lagged variable would be using few less observations (same as number of lags used in the model) than the model without lag variable. In the case of MM's sector-level regression models, the typical analysis period for 2017 load forecast analysis is of 28 years, that is from 1989/90 to 2016/17. For example, the model with two-year lag price variable would only use data of 26 years and may produce similar price elasticity as model without a lag variable. However, Daymark would like to stress that the use of lag variable needs to be based on economic reasoning besides getting statistical significant results.

PUB/DAYMARK - 20 Reference: Daymark Load Forecast Report Page 17

Preamble: Manitoba Hydro moved seven customers from the Top Consumers sector to the General Service Mass Market sector. The average use of these seven customers will now be forecasted using the GSMM regression model as opposed to direct customer input into the short term forecasts followed by Potential Large Industrial Load for long term forecasts.

Request:

a) Please explain whether the long term load growth of the seven customers is projected to be higher or lower with them in the General Service Mass Market sector as opposed to remaining in the Top Consumers sector. Put another way, does the GSMM regression model forecast higher or lower average use than PLIL?

b) In Daymark's view, was moving these customers to the GSMM sector an appropriate adjustment to the load forecast?

Response:

a) Daymark finds that the average usage forecast of customers of GSMM – Large becomes higher after moving seven customers from Top Consumers to GSMM – Large category. Daymark compared the average usage using the 2017/18 short-term load forecast of these seven customers that were included in MH 2014 Top Consumers Load Forecast Report along with the average usage and customer count forecasts of GSMM – Large category from MH 2017 load forecast analysis. Specifically, Daymark compared the average usage of GSMM – Large category estimated for 2017/18 in 2017 load forecast analysis with the average usage of GSMM – Large category should these seven customers have not moved from Top Consumer category to GSMM sector. The table below shows the calculation.

The 2014 Load Forecast Report estimated the average usage of these seven customers to be 64.6 GWh in 2017/18. Similarly, MH 2017 load forecast methodology estimated the average usage and customer count for GSMM – Large category to be 6.47 GWh and 357, respectively. Using this information, Daymark calculated the average load of GSMM – Large category by removing the load associated with seven Top Consumers customers that were moved to GSMM – Large category. Daymark found the average annual usage of GSMM – Large category would be 5.31 GWh without the inclusion of these seven customers in 2017/18. And, as mentioned earlier, MH 2017 load forecast analysis estimated that the average usage of GSMM – Large category by moving seven Top Consumer customer for 2017/18 is 6.47 GWh which is larger than 5.31 GWh.

Description	Average Usage (GWh)	Number of Customers
Seven Top Consumers customer moved to GSMM category	64.6	7
GSMM - Large (GWh) customers with recently moved seven customers to GSMM category	6.47	357
GSMM - Large (GWh) customer removing seven customers moved from GSMM Category	5.31	350

b) The seven companies that were moved from the top consumer sector to the GSMM – Large group include [redacted] It is appropriate to move these customers to GSMM – Large category for load forecasting purposes. Daymark reviewed the individual short-term load of these seven customers from the confidential version of the 2014 load forecast report. The individual short-term load forecasts of these customers were smaller compared to the remaining companies in the Top Consumer category and the annual load forecasts were also consistent across years. The total load of these seven customers was forecasted to be 452 GWh for each year in 2014 load forecasting analysis starting 2016/17 to 2019/20. It is reasonable to move these companies to GSMM – Large category for future load forecast purpose.

PUB/DAYMARK - 21 Reference: Daymark Load Forecast Report Page 23

While Manitoba Hydro uses an uncommon method for forecasting the monthly peaks, does Daymark find that Manitoba Hydro's methodology is valid and reasonable?

Response:

Daymark finds that MH's process of estimating monthly peaks based on the load factor method is valid and reasonable even though this is a less popular approach. The 2015 Itron "PGE Forecast Review Summary" found that most companies (59%) use econometric models to forecast monthly peaks, with the second most common approach (26% of companies) used load shapes. The third most common approach to forecast monthly peaks (used by 8% of companies) was the load factor method, which was the method used by Manitoba Hydro.

PUB/DAYMARK - 22 Reference: Daymark Load Forecast Report Page 24; PUB MFR 65U 2017 Load Forecast Pages 60 and 61

Preamble: "However, MH did not include any variable to account for fuel substitution, such as natural gas prices."

Manitoba Hydro's Residential load forecasting methodology includes the ratio of gas to electricity prices as a variable in its forecast of the number of new dwellings with electric space heat.

Request: If Manitoba Hydro includes the ratio of gas to electricity prices in the Residential forecast, please elaborate on Daymark's conclusion that fuel substitution is not included in Manitoba Hydro's load forecast.

Response:

MH considered natural gas prices in its forecast of space and water heating systems in both new and existing dwellings. Specifically, the ratio of gas to electricity price for high efficiency furnaces is used in the forecast of space heating in new dwellings (Pages 60, 61, 2017 Load Forecast Report). Please note that the forecast of heating system is part of MH's residential sector's end-use forecasting methodology. The end-use forecasting methodology is not fully utilized by MH in its residential load sector forecast. Besides balancing, the secondary end-use method is also relied upon to estimate the ratio of electric heat customers to total customers, which is one of the predictors in the primary residential average usage regression model.

The residential sector load forecast is based on the econometric model used for forecasting average usage for residential customer and forecast of residential sector customer count based on population forecast. Moreover, as pointed out in the Report (Page 33), the use of ratio of electric heat customers to total customers, also known as saturation variable, in Residential average usage regression model also gives arise to multicollinearity issue.

In addition, the load forecasting methodology developed by MH does not have a mechanism to account for potential fuel switching phenomenon in GSMM and GS Top Consumer sectors which comprise 68% of total consumer sales in 2016/17.

PUB/DAYMARK - 23 Reference: Daymark Load Forecast Report Page 31

Preamble: "The positive error percentages denote that the actual population is higher than the forecasted population. Similarly, the average error percentage on forecasts for residential customer counts varies from 0.35% in 1-year ahead forecasts to 4.5% in the 10-year ahead forecasts.[46] Since the load forecast for the residential sector is the product of the customer count forecast and the average usage forecast, the use of a lower-than-actual customer count forecast will result in a lower residential load forecast. Moreover, since residential customer count is one of the predictor variables for forecasting the number of GSMM customers, the use of under-forecasted residential customer numbers results in lower-than-actual GSMM customer counts, which in turn produces a lower GSMM load forecast."

Request:

a) Please provide recommendations to reduce or eliminate the consistent population forecasting error shown in Figure 10.

b) Please provide Daymark's views on whether Manitoba Hydro's methodology for determining the relationship between population or population growth and the number of customers is appropriate or whether it could be improved. If the latter, please provide recommendations for improving the forecast of the population to customer relationship.

Response:

a) The data used to create Figure 10, page 31 is the average of annual N-year ahead forecast errors. MH calculated N-year ahead population forecast errors by taking average of difference between actual and forecasted population from 1989 to 2016. MH could reduce the consistent population forecasting error in different ways. First, if any independent sources consistently under- or over-forecast,

which could be identified through an analysis of prior forecasts as compared to actuals, then MH could evaluate whether to use those forecasts going forward. Second, MH could evaluate the reasonableness of the individual independent forecasts by reviewing and comparing the underlying assumptions of the forecasts. Third, MH could rely on a single forecast based on its understanding of the underlying assumptions. Finally, MH could combine the independent forecasts based on the characteristics of each of the individual forecasts (perhaps weighting or another technique) rather than taking a simple average of all the independent forecasts.

b) Yes, MH's methodology for determining the relationship between population or population growth and number of residential customers is appropriate.

PUB/DAYMARK - 24 Reference: Daymark Load Forecast Report Page 32

Preamble: Footnote 47 states: “Price elasticity estimates the impact of a one percent change in electricity demand with a one percent change in electricity price.”

This definition of price elasticity suggests a one to one relationship between price and demand.

Request: Would footnote 47 be more correctly stated as “price elasticity estimates the impact of a one percent change in electricity price on electricity demand?”

Response:

Yes. Price elasticity estimates the impact of one percent change in electricity price on electricity demand.

PUB/DAYMARK - 25 Reference: Daymark Load Forecast Report Page 39

Preamble: Manitoba Hydro already includes high and low growth scenarios in its uncertainty analysis, as explained in Tab 4 page 8.

Request:

a) Please explain how Daymark's recommendation to include alternative load forecast scenarios differs from Manitoba Hydro's existing approach.

b) Please explain how Manitoba Hydro should amend or expand its approach to using alternative load forecast scenarios.

Response:

Combined response to part (a) and (b)

MH's method of evaluating load uncertainty documented in the filing created two different load growth scenarios by considering a P10 and P90 of the base load forecast.[1] In order to evaluate the potential load variation, The P10 and P90 load forecasts estimated by MH considered the variability due to long-term economic effects. The load forecast variability estimated at P10 and P90 are not utilized further in the load forecast analysis and documentation.

MH has the ability and expertise to develop comprehensive future forecast values that reflect the interactions of several different fundamental variables identified from its sensitivity analysis. Daymark recommended that an analysis investigating the impacts of uncertainty on the underlying forecasts variables is important to long-term planning decisions. Our discussion in the Report suggested alternatives including scenario analysis and probabilistic risk assessment. A scenario analysis would create load forecast growth rates for

[1] High (Low) Load = Base Forecast +/- 1.28*Standard Deviation

alternative futures considered. A future can be defined by varying anticipated trends in the forecasts of the key input variables used in the base load forecast to represent the type of future considered. For example, scenarios may consider key uncertainties by representing different assumptions for economic and population growth, electricity and fuel commodity prices, substitution impacts and CO_2 prices. Moreover, the different trends of key input variables considered in the scenarios would allow MH to account for the joint impact in the load forecast.

MH can also consider a more robust approach for its load forecast risk analysis by evaluating the inherent characteristics of each fundamental variable with the help of probabilistic (i.e., stochastic) risk assessments. This method provides a tool for estimating potential outcomes by allowing random variations in one or more key input variables. Probabilities are assigned to different values of the key uncertain variables, preferably identified through sensitivity analysis. The random variations can be based on fluctuations observed in historical data using standard time-series techniques. Outcomes are then identified that are associated with different values of the key factors in combination. Since the probabilistic method involves generating multiple outcomes by varying key input variables, the final result often includes the expected outcome and a probability distribution for these key factors.

PUB/DAYMARK - 26 Reference: Daymark Load Forecast Report Page 45; PUB/MH I-57

Please provide Daymark's views, based on its experience, of whether Manitoba Hydro's load forecast accuracy has been in line with those of other load serving entities.

Response:

Daymark reviewed MH load forecast reports and industry-practice methodology to assess load forecast accuracy. On page 47 of the "2017 Electric Load Forecast" report provided by Manitoba Hydro, the Company mentions that "there is only an 80% chance that a 5-year energy forecast will be within 3.2% of the actual, and an 80% chance that a 10-year energy forecast will be within 4.3% of the actual" regarding their forecasts.

Daymark agrees with MH's methodology to evaluate load forecast analysis. However, MH can explore additional analysis to analyze accuracy process. A study by Itron, "2013 Forecasting Benchmarking Study," looked at Mean Absolute Percent Errors (MAPE) among surveyed utilities to evaluate load forecast accuracies. According to the same Itron study, the average forecast accuracy based on the survey responses from utilities was between 1.5% and 3.25%. Moreover, as mentioned in Daymark's Load Forecast Review Report on Page 45, "MH can use additional methods to analyze its load forecast accuracies. For example, the sum of errors and annual average growth rate (AAGR) can be alternative metrics to compare forecasts with actual load.[1] The sum of errors is the ratio of the difference between forecasted and actual load to the actual load for any given year. The annual average growth rate[2] compares the load growth rate between two years of actual and forecasted load."

[1] Hyndman, R., 2006. Another Look at Forecast Accuracy Metrics for Intermittent Demand. Foresight Int. J. Appl. Forecast. 43–46. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.218.7816&rep=rep1&type=pdf

[2] $Y_{t+n} = Y_t * (1 + AAGR)^n$

PUB/DAYMARK - 27 Reference: Daymark Load Forecast Report Page 47

Preamble: "MH may get better estimates of weather-dependent load by relying on more than two years of monthly energy and degree days to estimate the weather-dependent relationship...Daymark re-produced the regression results by using the previous ten years of monthly energy usage and weather data using the same weather normalization modeling parameters used by MH. The use of 10-year monthly usage and weather data for residential usage produced lower CDD and HDD coefficients than the coefficients estimated by MH's use of two years of data."

Request: Please characterize and, if possible, quantify the impact to the load forecast of using the lower CDD and HDD coefficients calculated by Daymark.

Response:

MH indicates in its load forecast report that its load forecast is adjusted to reflect 'normal' weather. MH defines the 'normal' weather components by using a 25-year rolling average temperature to calculate normal HDD and CDD. The historical annual loads are adjusted to account for weather variability within its load forecasting process annually. MH uses following relationship for weather normalization in its load forecasting process (2017 Load Forecast Report, Page 42) to adjust its annual actual, observed load.

Equation (1):

$$\begin{aligned}\text{Weather Adjustment} &= \text{HDD weather effect} * (\text{HDD actual} - \text{HDD normal}) \\ &+ \text{CDD weather effect} * (\text{CDD actual} - \text{CDD normal})\end{aligned}$$

Equation 2:

$$\text{Weather Adjusted Actual} = \text{Actual} - \text{Weather Adjustment}$$

Specifically, the weather adjustment is calculated by relying on weather regression coefficients and the difference between the 'normal' and actual year's HDD and CDDs. In Equation 1, the weather regression coefficients are expressed by 'HDD weather effect' and 'CDD weather effect'. As shown in Equation 2, the annual weather-adjusted actual load is the difference between actual, observed load and annual weather-dependent usage estimated by Equation (1). These historical weather-adjusted loads are then used in the load forecasting process to estimate the load of future years with an assumption of 'normal' year weather.

All else being equal, the lower HDD and CDD regression coefficients estimated by Daymark using 10-years of monthly load and weather information would produce smaller weather adjustments to load (as expressed in Equation 1). For actual HDD and CDDs higher than that of a 'normal' year, the lower weather regression coefficients would result in a higher weather-adjusted normalized load than the weather-adjusted load calculated by using higher HDD and CDD regression coefficients. Similarly, if the actual HDD and CDDs were lower than that of the 'normal' year, the lower weather regression coefficients would have produced lower weather-adjusted load than with the higher regression coefficients.

Since, the impact on weather-adjusted load varies depending on how actual HDD and CDDs compares with that of 'normal' year, it is not clear how the use of lower weather-regression coefficients would impact the load forecast without further analysis. However, use of more than two years of data would produce consistent weather-

dependent coefficients than MH's current practice of using two years of data. Regression models usually produce robust estimates when more data points are used. Since there is wide variation in recent weather patterns, the use of more monthly observation in the weather normalization model will help improve the robustness of weather dependent estimates.

PUB/DAYMARK - 28 Reference: Daymark Load Forecast Report Page 48

Preamble: "MH could also improve its weather normalization by using a shorter-period to calculate the "normal" year weather variables. As mentioned earlier, MH used a 25-year rolling average to get normal year weather parameters for CDD and HDD. Many utilities are moving to the use of shorter time-periods to create normal weather temperature profiles."

Beginning in approximately 2011, Manitoba Hydro moved from a 10 year period to calculate normal weather to a 25 year period.

Request:

a) Please confirm whether a 10 year period is in line with Daymark's recommendation to move to a shorter period to calculate normal weather.

b) Please comment on the implications to the domestic revenue forecast resulting from a large step change in the number of degree days heating. Would a large decline in the forecast for normal degree days heating cause a large decrease in forecasted revenue, solely from the change in the normal weather DDH? For example, the normal weather calculation for 2007/08 resulted in a decrease in degree days heating of 146 using a 10 year average, compared to a decrease of 7 degree days heating using a 25 year average.

Response:

a) Yes, based on review of industry practices, it is Daymark's recommendation that utilizing a 10- year period to calculate normal weather is a reasonable movement to a shorter period of time.

According to the Itron "2013 Forecasting Benchmarking Survey," utility forecasters were moving from 30-year periods for normal weather calculations to

shorter periods such as 20-year and 10-year periods. Comparing reported time periods between 2006 and 2013, the most widely used timeframe for normal weather calculations went from being 30-year to 20-year period. The utilization of 10-year time periods grew from 2006 to 2013, becoming the 3rd most popular period (22% of respondents) used by forecasters after 30-year (27% of respondents) and 20-year period (34% of respondents). Only 1% of respondents used a 25-year period, which was the period length used by Manitoba Hydro.

b) The 'normal' year HDD are used along with the weather regression coefficients and actual year's HDD to estimate weather dependent load as discussed to the response to PUB/DAYMARK – 27. Since there is positive correlation between the domestic revenue forecast and the load forecast, it's easier to understand the impact on the revenue forecast due to the change in the definition of 'normal' year, by first evaluating the impact of the change in 'normal' year HDD calculation on load forecast.

The switch from a 25-year average to a 10-year average to define a 'normal' year would change 'HDD Normal' and 'CDD Normal' values as shown by Equation 1 in PUB/DAYMARK – 27. And the change in "normal" year weather values would then produce different magnitude of weather-dependent load (see Equation 1 in PUB/DAYMARK – 27). The impact on weather dependent load would be different depending on how 'normal' HDD and CDD compare with particular year's HDD and CDD values. For scenario where the 'normal' year HDD becomes higher due to the switch to a 10-year basis, all else being equal, the weather-dependent load would be smaller if the actual year's HDD is greater than the 10-year average HDD. However, for the same scenario if actual year's HDD is smaller than 10-year average HDD, the weather-dependent portion would be greater by using 10-year average HDD as 'normal' year. Therefore, the impact on

weather-adjusted load varies depending on how actual HDD compares with the proposed 10-year average for ‘normal’ year.

Since the impact of weather dependent load varies depending on how actual HDD of a year compares with the proposed 10-year ‘normal’ HDD, it is not clear how the change in ‘normal’ year definition would impact the load forecast without further investigation. Similarly, the impact on domestic revenue forecast due to the change in ‘normal’ year weather change would be hard to tell without further analysis.

PUB/DAYMARK - 29 Reference: Daymark Load Forecast Report Pages 48 and 49

Please explain whether Daymark finds Manitoba Hydro's treatment of DSM In the load forecast to be problematic. If so, please recommend improvements to the treatment of DSM.

Response:

It is Daymark's understanding that DSM savings for the historic years is added back to the metered and weather adjusted actual load prior to running regression analyses. The econometric model, therefore, includes historical weather-adjusted load along with DSM savings (both Codes & Standards and program based savings). The forecast results from the econometric model are adjusted for future Codes and Standards, Electric Vehicles and advancement of savings in Lighting not captured by future Code and Standards as a result of the adoption of LED lighting. Daymark finds that MH method of DSM treatment is consistent with the method used by BC Hydro in its load forecast. BC Hydro forecasts using this same approach, that is, running its regressions with DSM historic savings added back to metered loads[1]. The key question is to ensure that the resulting load forecast appropriately reflects metered loads under normal weather that MH will need to serve. Daymark's recommendation is that MH fully document the series of steps by including tables demonstrating the steps of DSM treatment in the process for ease of review in the future.

[1] BC Hydro, Fiscal 2017 to Fiscal 2019 Revenue Requirements Application, Chapter 3-Load and Revenue Forecast.

PUB/DAYMARK - 30 Reference: Daymark Load Forecast Report Pages 51 to 55

Please confirm whether Daymark views the changes in the load forecast methodologies for i) Residential, ii) General Service Mass Market, and iii) Top Consumers to be reasonable and appropriate. If not confirmed, please identify the specific changes that Daymark views as unreasonable or inappropriate.

Response:

Regarding the load forecasting methodology changes between 2014 and 2017 for i) Residential, ii) General Service Mass Market, and iii) Top Consumers, Daymark believes that the changes are generally appropriate and reasonable developments by the MH load forecasting team. The following topics, however, should be modified:

1) The PLIL methodology should use the historical data for all the customers that are in Top Consumers category. The 2017 PLIL method used a conservative approach by only considering the total load of top consumer companies that have been in the MH service territory since 1983/84, thus excluding the historical load of three companies that are currently in the top consumers sector.
2) MH should test more complexly and document any concerns and potential mitigation with regard to the robustness of the regression coefficients estimated by its econometric models. For example, the average electricity usage regression models contain multicollinearity issues. Similarly, MH should document and explain the economic reasoning publicly when introducing any new predictor variables into its regression models in addition to checking the statistical concerns, and potential implications for its price elasticities.

PUB/DAYMARK - 31 Reference: Daymark Load Forecast Report Pages 18, 54, and 55

Preamble: “However, the 2017 PLIL method used a conservative approach by only considering the total load of top consumer companies that have been in MH's service territory since 1983/84, the start year of MH's modeling period.”

Please provide Daymark’s views whether, instead of excluding customer load of three companies that joined after 1983/84, it would be more appropriate to base the Potential Large Industrial Load calculation on a more recent data set of all Top Consumer loads, such as the past 10 years. If a more recent data set is appropriate, please give Daymark’s views as to what period should be used.

Response:

Daymark does not believe that using a shortened data set of more recent data for the Potential Large Industrial Load calculation is necessary. Longer data sets are preferred since they provide more historical data points for estimating load forecast, particularly when utilizing regressions to project results. The exclusion of customers is more problematic than the length of the time period with regard to the calculation of Potential Large Industrial Load. As mentioned in Page 18 of Daymark’s Load Forecasting Review Report, “By excluding the historical load of these companies, the 2017 PLIL method did not consider the possibility of additional load from two sources: (1) future new customers that may be joining the MHs service area, nor (2) additional growth from the three companies that were not part of the group for the entire historical period.”

PUB/DAYMARK - 32 Reference: Daymark Load Forecast Report Page 58

Please provide Daymark's views whether the inputs to the load forecast – income, GDP, population – are appropriately determined, or whether there are improvements that can be made to the determination of these inputs.

Response:

Daymark understands and agrees with MH's method of using multiple independent sources to create its population and GDP forecasts. This approach incorporates the views of multiple experts. However, MH could improve its application of multiple independent population forecasts in various ways. First, if any independent sources consistently under- or over-forecast, which could be identified through an analysis of prior forecasts as compared to actuals, then MH could evaluate whether to use those forecasts going forward. Second, MH could evaluate the reasonableness of the individual independent forecasts by reviewing and comparing the underlying assumptions of the forecasts. Third, MH could rely on a single forecast based on its understanding of the underlying assumptions. Finally, MH could combine the independent forecasts based on the characteristics of each of the individual forecasts (perhaps weighting or another technique) rather than taking a simple average of all the independent forecasts.

PUB/DAYMARK - 33 Reference: Daymark Load Forecast Report Page 29

Preamble: "There are a couple of issues with the way the blended GDP is created and used in the analysis."

Request: Please give Daymark's views on how the blended GDP variable used in the General Service Mass Market and Top Consumers forecasts should be improved.

Response:

Daymark believes that, instead of a blended GDP variable, the Company could use GDP variables separately for US, Canada, or Manitoba considering that including GDP variables separately do not contain any statistical concerns. Manitoba Hydro could also choose one GDP variable to other based on the sector modeled if the regression results are favorable. Moreover, the coefficient of GDP variable in average usage regression model gives GDP elasticity, use of a single GDP would be easier to interpret than current use of blended GDP.

PUB/DAYMARK - 34 Reference: Daymark Load Forecast Report Page 19 and 20

Please provide Daymark's views on the appropriateness of Manitoba Hydro's methods to estimate transmission and distribution losses and how those losses are factored into the load forecast.

Response:

Daymark finds MH method of estimating transmission and distribution losses and consideration of these losses in the load forecast analysis to be reasonable.